


Respectfully submitted,

STATTLER JOHANSEN & ADELI LLP

Dated: January 11, 2002



John Stattler
Reg. No.: 36,285

Stattler Johansen & Adeli LLP
P.O. Box 51860
Palo Alto, CA 94303-0728
Phone: (650) 934-0470 x102
Fax: (650) 934-0475

20110111 09:43:53

Office Action Summary

Application No.

09/681,776

Applicant(s)

TEIG ET AL.

Examiner

Dao H Nguyen

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

1. In response to the communications dated 06/03/2001 through 04/05/2002, claims 1-20 are active in this application as a result of the cancellation of claims 21-47.

Acknowledges

2. Receipt is acknowledged of the following items from the Applicant.
 - a. Affirmation of the election without traverse to prosecute the invention of Group I, claims 1-34 and 36-41 was made in the Response to Restriction Requirement, dated 04/05/2002, and made of record as Paper No. 6.
 - b. Cancellation of claims ²¹⁻⁴⁷~~7-10~~. This cancellation was made in the Preliminary Amendment, which is concurrently filed with the Response to Restriction Requirement, and made of record as Paper No. 7.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

4. Claims 4 and 14 are objected to under 37 CFR 1.75 as being substantial duplicate of claims 3 and 13, respectively. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 1 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, lines 2-3, the phrase "said region comprising an area of said metal layer of at least 100 microns" renders the claim indefinite because the limitation(s) "an area ... of at least 100 microns" is unclear. Micron is the unit of length, not of area (square micron, ect.).

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

8. Claims 1-10 are rejected under 35 U. S. C. § 102 (b) as being anticipated by U.S. Patent No. 6,150,193 to Glenn.

Regarding to claim 1, Glenn discloses an integrated circuit, as shown in figures 7C, 8(A-C), and 13(A-A), comprising:

at least one metal layer comprising at least one region 50 (Fig. 8C), said region comprising an area of said metal layer and comprising a plurality of conductors 26 to interconnect points on said integrated circuit, said conductors comprising a plurality of preferred diagonal direction conductors and at least one zag conductor; said preferred diagonal direction conductors being deposited in a preferred diagonal direction, wherein said preferred diagonal direction defines a direction relative to the boundaries of the integrated circuit (Fig. 8C); and

said at least one zag conductor being deposited in a Manhattan (or horizontal or vertical) direction and being coupled to one of said preferred diagonal direction conductors so as to interconnect points on said integrated circuit using at least one zag

conductor and at least one preferred diagonal direction conductor. See further column 7, line 39 to column 9, line 8.

Regarding to claims 2, 3 and 4, Glenn discloses the integrated circuit, wherein said preferred diagonal direction comprises plus or minus 45 degrees relative to the boundaries of said integrated circuit. See figure 8C.

Regarding to claims 5 and 6, Glenn discloses the integrated circuit, wherein said preferred diagonal direction comprises plus or minus 60 degrees relative to the boundaries of said integrated circuit. See figure 7C.

Regarding to claims 7 and 8, Glenn discloses the integrated circuit, wherein said preferred diagonal direction comprises plus or minus 30 degrees relative to the boundaries of said integrated circuit. See figure 7C.

Regarding to claims 9 and 10, Glenn discloses the integrated circuit, wherein said Manhattan direction of said at least one zag comprises a horizontal or a vertical direction relative to the boundaries of said integrated circuit. See figure 7C, and figure 8C.

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 11-20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,150,193 to Glenn, in view of the following remark, or of Ozawa et al., U.S. Patent No. 6,316,838.

Regarding to claim 11, Glenn discloses an integrated circuit, as shown in figures 7C, 8(A-C), and 13(A-A), comprising:

at least one metal layer comprising a plurality of conductors to interconnect points on the integrated circuit, said conductors being deposited in a preferred diagonal direction, wherein said preferred diagonal direction defines a direction, relative to the boundaries of the integrated circuit; and

at least one zag conductor, coupled to a conductor deposited in a diagonal direction, said zag conductor being deposited in a Manhattan (or horizontal or vertical) direction so as to interconnect points on said integrated circuit using at least one zag conductor and at least one preferred diagonal direction conductor. See further column 7, line 39 to column 9, line 8.

Glenn does not mention about the conductors being deposited in a preferred diagonal direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors on the metal layer. However, it would have been an obvious

matter of design choice to depose a certain percentage of conductors in a preferred direction, since applicant has not disclosed that depositing at least fifty percent of conductors on the metal layer in a preferred diagonal direction solves any stated problem or is for any particular purpose.

In addition, Ozawa et al. disclose an integrated circuit, as shown in figures 4 and 5, comprising a metal layer having a plurality of conductors, wherein the conductors are deposited in a preferred diagonal direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors on the metal layer. Hence, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the invention of Glenn so that the conductors of Glenn's invention being deposited in diagonal direction as that of Ozawa et al., because those skilled in the art will recognize that such modification and variations can be made without departing from the spirit of the invention of Glenn.

Regarding to claims 12, 13 and 14, Glenn in view of the above remark, or in view of Ozawa et al., disclose the integrated circuit, wherein said preferred diagonal direction comprises plus or minus 45 degrees relative to the boundaries of said integrated circuit. See figure 8C of Glenn.

Regarding to claims 15 and 16, Glenn in view of the above remark, or in view of Ozawa et al., disclose the integrated circuit, wherein said preferred diagonal direction

comprises plus or minus 60 degrees relative to the boundaries of said integrated circuit.
See figure 7C.

Regarding to claims 17 and 18, Glenn in view of the above remark, or in view of Ozawa et al., disclose the integrated circuit, wherein said preferred diagonal direction comprises plus or minus 30 degrees relative to the boundaries of said integrated circuit.
See figure 7C.

Regarding to claims 19 and 20, Glenn in view of the above remark, or in view of Ozawa et al., disclose the integrated circuit, wherein said Manhattan direction of said at least one zag comprises a horizontal or a vertical direction relative to the boundaries of said integrated circuit. See figure 7C, and figure 8C.

Conclusion


11. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Art Unit: 2818

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dao Nguyen whose telephone number is (703) 305-1957. The examiner can normally be reached on Monday-Friday 9:00am - 6:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (703) 308-4910. The fax numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read 'Dao H. Nguyen', with a long horizontal stroke extending to the right.

Dao H. Nguyen
Art Unit 2818
June 07, 2002

HOAI HO
PRIMARY EXAMINER

Notice of References Cited

Application/Control No.

09/681,776

Applicant(s)/Patent Under
Reexamination
TEIG ET AL.

Examiner

Dao H Nguyen

Art Unit

2818

Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,150,193	11-2000	Glenn, Thomas P.	438/112
	B	US-6,316,838	11-2001	Ozawa et al.	257/686
	C	US-5,637,920	06-1997	Loo, Mike C.	257/700
	D	US-5,646,830	07-1997	Nagano, Junya	257/666
	E	US-6,307,256	10-2001	Chiang et al.	257/668
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Office Action Summary

Application No.

09/681,776

Applicant(s)

TEIG ET AL.

Examiner

Dao H Nguyen

Art Unit

2818

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-13 and 15-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-13 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. In response to the communications dated 12/23/2002, claims 1-3, 5-13, and 15-20 are active in this application as a result of the cancellation of claims 4 and 14.

Corrections

2. In the previous Office Action (dated 06/13/2002), under the section headed "Acknowledges", subsection b, Examiner had incorrectly typed that the cancelled claims were 7-10. Correction is made as following:

Cancellation of claims 21-47. This cancellation was made in the Preliminary Amendment, which is concurrently filed with the Response to Restriction Requirement, and made of record as Paper No. 7.

Remarks

3. Applicant's arguments with respect to claims 1-3, 5-13, and 15-20 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

Art Unit: 2818

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 1-3, and 5-10 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 7, the limitation "said conductors " is not clearly defined and distinctly pointed out the subject matter which is claimed as the Applicant's invention. It is not clear if the "said conductors" includes all conductors in the first and the second region or just includes the conductors in the second region. Is there any difference between the "said conductor" in line 5 and the "said conductor" in line 7.

Claims 1-3, 5-10 depend from rejected claim 1 and include all of the limitations of claim 1 thereby rendering these dependent claims indefinite.

Claim Rejections - 35 U.S.C. § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3, 5-10 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 6,316,838 to Ozawa et al., in view of the following remarks.

Art Unit: 2818

Regarding claim 1, Ozawa discloses an integrated circuit, as shown in figures 4, 5, comprising:

a metal layer comprising a plurality of regions, wherein a first contiguous region (region comprising of diagonal and horizontal conductors) comprises a plurality of conductors 62 to interconnect points on the integrated circuit, the conductors 62 comprising a plurality of preferred diagonal direction conductors (diagonal part of the conductor 62) and zag conductors (horizontal part of the conductor 62), and wherein a second contiguous region (region comprising of vertical conductors) comprises a plurality of conductors (which connect the vias 60 to the pad 58) such that at least fifty (50) percent of the conductors in the second contiguous region are arranged in a preferred direction (vertical direction) other than the preferred diagonal direction;

the preferred diagonal direction conductors 62 comprising at least fifty (50) percent of the conductors in the first region and being deposited in a preferred diagonal direction that forms a Euclidean angle relative to the boundaries of the integrated circuit; and

the zag conductors (horizontal part of 62) being deposited in a Manhattan direction and being coupled to one of the preferred diagonal direction conductors so as to interconnect points on the integrated circuit using the zag conductors and the preferred diagonal direction conductor. See figure 5.

Ozawa does not specifically teach that the first contiguous region comprises an area of at least 100 square microns. However, it would have been obvious to one of

Art Unit: 2818

ordinary skill in the art at the time the invention was made that the first contiguous region of Ozawa could be modified to have any area, either greater or less than or equal to 100 square microns, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

Regarding claims 2, 3, 5-10, though Ozawa does not specifically describe the angle created by the diagonal direction conductor relative to the boundaries of the integrated circuit, and the direction of the zag conductors. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made that the diagonal conductors of Ozawa could absolutely be made in any angle relative to the boundaries of the integrated circuit, and the direction of the zag correspondingly could be made in either horizontal or vertical direction, since none of such angles or such directions would make any difference in the scope of the invention of Ozawa, and that such various angles and directions could be made by involving only routine skill in the art.

8. Claims 11-13, and 15-20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 5,822,214 to Rostoker et al., in view of the following remarks, or in view of Ozawa et al., U.S. Patent No. 6,316,838.

Regarding claim 11, Rostoker discloses an integrated circuit, as shown in figures 2-10, comprising:

Art Unit: 2818

a plurality of metal layers 117-119 with each metal layer comprising a plurality of conductors to interconnect points on the integrated circuit, at least fifty (50) percent of the conductors on a first metal layer 119 being deposited in a first preferred diagonal direction, wherein the first preferred diagonal direction defines a direction that forms a Euclidean angle relative to the boundaries of the integrated circuit, for at least fifty percent of conductors on the first metal layer; (See figures 4 and column 14, lines 1-14)

at least fifty (50) percent of the conductors on a second metal layer 118 arranged in a second preferred diagonal direction, wherein the second preferred diagonal direction defines a direction, different than the first preferred diagonal direction, that forms a Euclidean angle relative to the boundaries of the integrated circuit.

Rostoker does not explicitly discuss about zag conductor. However, as stated in column 6, lines 7-15, column 7, lines 1-20, and column 7, line 60 to column 8, line 4, in the invention of Rostoker, tri-direction, hexagonal routing, rectilinear routing may be used to connect the terminals and the gates of the device, it would have been obvious to one having ordinary skill in the art at the time the invention was made that the invention of Rostoker does have zag conductors which connect the contacts from the outside to the diagonal lines described above.

On the other hand, in U.S. Patent No. 6,316,838, Ozawa discloses metal layer having diagonal conductors 62 and zag conductors connecting the vias 60 to the pad 58. It would have been obvious to one having ordinary skill in the art at time the invention was made to modify the invention of Rostoker so that it would have the zag

Art Unit: 2818

conductors as those of Ozawa in order to connect separated equi-electrodes together (see column 6, lines 45-49 of Ozawa). Further, it would have been obvious that such modification and variation can be made with only routine skill in the art.

Regarding claim 12, 13 and 15-18, Rostoker discloses all the claimed limitations. See figures 2-4.

Regarding claims 19-20, though Rostoker does not specifically describe about the direction of the zag conductors. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made that the direction of the zag could be made in either horizontal or vertical direction, since none of such directions would make any difference in the scope of the invention of Rostoker, and that such various and directions could be made by involving only routine skill in the art.

Similarly, Rostoker in view of Ozawa disclose all the claimed limitations. See the rejection of claims 9 and 10 above.

Conclusion

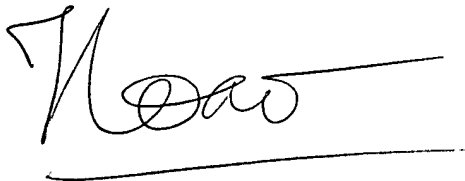
9. **THIS ACTION IS MADE FINAL.** A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH**

Art Unit: 2818

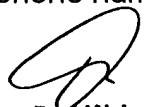
shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dao Nguyen whose telephone number is (703) 305-1957. The examiner can normally be reached on Monday-Friday 9:00am - 6:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (703) 308-4910. The fax numbers for Customer Service is (703) 872-9317, for the organization where this application proceeding is assigned is (703) 872-9318 for regular (Before Final) communications or (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



Dao H. Nguyen
Art Unit 2818
March 24, 2003



David Nelms
Supervisory Patent Examiner
Technology Center 2800

Notice of References Cited

Examiner

Dao H Nguyen

2848

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-5,822,214	10-1998	Rostoker et al.	716/10
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

BEST AVAILABLE COPY

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

BEST AVAILABLE COPY

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/733,104	12/07/2000	Steven Teig	SPLX.P0004	2615

23349 7590 01/03/2002

STATTLER JOHANSEN & ADELI
P O BOX 51860
PALO ALTO, CA 94303

EXAMINER

CHU, CHRIS C

ART UNIT	PAPER NUMBER
----------	--------------

2815

DATE MAILED: 01/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

BEST AVAILABLE COPY

Office Action Summary

Application No.

09/733,104

Applicant(s)

TEIG ET AL.

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1 - 16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 6 ~ 15 been renumbered 7 ~ 16.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 10 ~ 12, and 14 ~ 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Bezama et al.

Note Fig. 1 of Bezama et al., where he/she shows an integrated circuit comprising: at least one metal layer comprising a plurality of sections (see Fig. 1), each section comprising a

Art Unit: 2815

plurality of conductors (36, 38, 40, and 41) to interconnect points on the integrated circuit (see Fig. 1), wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section (see Fig. 1); a first section (24) comprising a first preferred direction for the conductors deposited in the first section (see Fig. 1); and a second section (14) comprising a preferred diagonal wiring direction (read column 5, lines 35 ~ 40) for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction (see Fig. 1).

Regarding claim 10, note Fig. 1 of Bezama et al., where he/she shows the first preferred direction comprises a first Manhattan direction (see Fig. 1).

Regarding claim 12, note Fig. 1 of Bezama et al., where he/she shows at least one more section having a preferred direction comprising a Manhattan direction (see Fig. 1).

Regarding claim 14, note Fig. 1 of Bezama et al., where he/she shows the preferred direction comprises a diagonal direction (read column 5, lines 35 ~ 40); and the direction different than the preferred direction comprises a Manhattan direction (see Fig. 1).

Regarding claim 15, note Fig. 1 of Bezama et al., where he/she shows the preferred direction comprises a Manhattan direction (see Fig. 1); and the direction different than the preferred direction comprises a diagonal direction (read column 5, lines 35 ~ 40).

Regarding claim 16, note Fig. 1 of Bezama et al., where he/she shows the direction different than the preferred direction comprises a direction complementary to the preferred direction (see Fig. 1).

4. Claims 1 ~ 9, 11, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Funaki et al.

Note Fig. 1 of Funaki et al., where he/she shows an integrated circuit comprising: at least one metal layer comprising a plurality of sections (see Fig. 1), each section comprising a plurality of conductors (D1, S1, and G1) to interconnect points on the integrated circuit (see Fig. 1), wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section (see Fig. 1); a first section (the left side) comprising a first preferred direction for the conductors deposited in the first section (see Fig. 1); and a second section (the right side) comprising a preferred diagonal wiring direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction (see Fig. 1).

Regarding claim 2, note Fig. 1 of Funaki et al., where he/she shows the first preferred direction comprises a diagonal direction (see Fig. 1).

Regarding claim 3, note Fig. 1 of Funaki et al., where he/she shows the first preferred diagonal direction comprises a direction perpendicular to said a preferred diagonal wiring direction in said second section (see Fig. 1).

Regarding claim 4, note Fig. 1 of Funaki et al., where he/she shows the diagonal direction comprises an octilinear direction (see Fig. 1).

Regarding claim 5, note Fig. 20 of Funaki et al., where he/she shows the diagonal direction comprises a hexilinear direction (see Fig. 20 and read column 11, lines 33 ~ 41).

Art Unit: 2815

Regarding claim 6, note Fig. 1 of Funaki et al., where he/she shows the first preferred direction comprises a first diagonal direction (see Fig. 1); and the second preferred direction comprises a second diagonal direction, different from the first diagonal direction (see Fig. 1).

Regarding claim 7, note Fig. 1 of Funaki et al., where he/she shows the first diagonal direction comprises an octalinear direction (see Fig. 1); and the second diagonal direction comprises an octalinear direction complementary to the first diagonal direction (see Fig. 1).

Regarding claim 8, note Fig. 20 of Funaki et al., where he/she shows the first diagonal direction comprises a hexalinear direction (see Fig. 20); and the second diagonal direction comprises a hexalinear direction complementary to the first diagonal direction (see Fig. 20).

Regarding claim 9, Funaki et al. discloses the first diagonal direction comprises an octalinear direction (see Fig. 1); and the second diagonal direction comprises a hexalinear direction (see Fig. 20).

Regarding claim 11, note Fig. 1 of Funaki et al., where he/she shows at least one more additional section having a preferred direction comprising a diagonal direction (see Fig. 1).

Regarding claim 13, note Fig. 8 of Funaki et al., where he/she shows at least one additional wire deposited in a section with a direction different than the preferred direction of the section (see Fig. 8).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fuchida et al., Weber, Igarashi et al., Rostoker et al., and Fujiwara et al. disclose a semiconductor device.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

C.C.
December 27, 2001



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Notice of References Cited	Application/Control No. 09/733,104	Applicant(s)/Patent Under Reexamination TEIG ET AL.	
	Examiner Chris C. Chu	Art Unit 2815	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6262487 - B1	07-2001	Igarashi et al.	257/785
	B	US-5811863 - A	09-1998	Rostoker et al.	257/401
	C	US-5723908 - A	03-1998	Fuchida et al.	257/758
	D	US-5635736 - A	06-1997	Funaki et al.	257/202
	E	US-5541005 - A	07-1996	Bezama et al.	428/551
	F	US-4855253 - A	08-1989	Weber	438/18
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

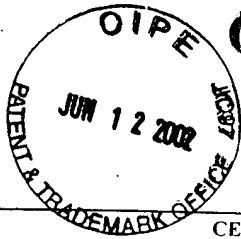
*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	JP - 04000677 - A	01-1992	Japan	Fujiwara et al.	---
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

BEST AVAILABLE COPY

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a))
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



COPY OF PAPERS
ORIGINALLY FILED

Docket No.: SPLX.P0004

CERTIFICATE OF MAILING BY "FIRST CLASS MAIL"

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on June 3, 2002.

John Stattler
John Stattler

#8/a
7/17/02
Surles

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Steven Teig, et al.

Serial No.: 09/733,104

Filed: December 7, 2000

For: **Multi-Directional Wiring On A Single
Metal Layer**

RECEIVED
JUN 25 2002
TECHNOLOGY CENTER 2800

AMENDMENT AND RESPONSE TO OFFICE ACTION

Assistant Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

In response to the Office Action dated January 3, 2002, please amend the patent application as follows:

IN THE CLAIMS:

Please amend claims 1, ³3, 7-9, and 14-16 as follows:

1. (Once Amended) An integrated circuit comprising:

BEST AVAILABLE COPY

at least one metal layer comprising a plurality of sections, each section comprising at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit, wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section;

a' a first section comprising a first preferred direction for the conductors deposited in the first section; and

a second section comprising a preferred diagonal wiring direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction, said second section further comprising at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction.

al. 9/12/02 3. (Once Amended) The integrated circuit as set forth in claim 2,
a2 wherein the first preferred diagonal direction comprises a direction perpendicular to said preferred diagonal wiring direction in said second section.

7. (Once Amended) The integrated circuit as set forth in claim 6,
a3 wherein:

the first diagonal direction comprises an octilinear direction; and

BEST AVAILABLE COPY

the second diagonal direction comprises an octilinear direction complementary to the first diagonal direction.

8. (Once Amended) The integrated circuit as set forth in claim 6, wherein:

the first diagonal direction comprises a hexalinear direction; and

23 the second diagonal direction comprises a hexalinear direction complementary to the first diagonal direction.

9. (Once Amended) The integrated circuit as set forth in claim 6, wherein:

the first diagonal direction comprises an octilinear direction; and

the second diagonal direction comprises a hexalinear direction.

14. (Once Amended) The integrated circuit as set forth in claim 13, wherein:

24 the preferred direction comprises a diagonal direction; and

the direction different than the preferred direction comprises a Manhattan direction.

15. (Once Amended) The integrated circuit as set forth in claim 13, wherein:

BEST AVAILABLE COPY

the preferred direction comprises a Manhattan direction; and
the direction different than the preferred direction comprises a diagonal direction.

Q4 16. (Once Amended) The integrated circuit as set forth in claim 13,
wherein the direction different than the preferred direction comprises a direction
complementary to the preferred direction.

Please add new claim 17 as follows:

Q5 17. (New) An integrated circuit comprising:
at least one metal layer comprising a plurality of sections, each section comprising
at least one thousand conductors situated in a contiguous area to interconnect points on
the integrated circuit, wherein a preferred direction, within a section, defines a direction,
relative to the boundaries of the integrated circuit, for at least fifty percent of conductors
in the section;

a first section comprising a Manhattan wiring direction for the conductors
deposited in the first section, the first section further comprising at least one conductor
deposited in a diagonal direction coupled to a conductor deposited in the Manhattan wiring
direction; and

a second section comprising a preferred diagonal wiring direction for the
conductors deposited in the second section, such that the diagonal wiring preferred
direction is a direction different from the first preferred direction.

BEST AVAILABLE COPY

REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is respectfully requested.

Overview of the Claimed Invention:

An integrated circuit has at least one metal layer that includes conductors to provide interconnectivity for the integrated circuit chip. For purposes of assigning preferred wiring directions for the conductors, the metal layer is divided into at least two sections. A section is a contiguous area of the IC that contains at least one thousand wires. Each section has a preferred wiring direction. The preferred direction, within a section, defines a direction, relative to a boundary of the integrated circuit, for at least fifty percent of conductors in the section. For example, if the preferred direction is a horizontal direction, then at least fifty percent of the conductors in that section are oriented horizontally relative to the boundaries of the integrated circuit chip. To more efficiently utilize the space on the metal layer, a first section has a preferred direction for the conductors contained in the first section. A second section, on the same metal layer as the first section, has a diagonal preferred wiring direction for the conductors in its section.

Wires in a section may be deposited in a direction other than the preferred direction. A wire deposited in a Manhattan direction in a section that has a preferred

BEST AVAILABLE COPY

diagonal direction is referred to herein as a "zag." In one embodiment, a section may comprise a diagonal preferred wiring direction, and the section may have at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in the preferred diagonal wiring direction. A section may also contain zigs. A wire deposited in a diagonal direction in a section that has a preferred Manhattan direction is referred to herein as a "zig." For example, a section may comprise a Manhattan preferred wiring direction, and the section may have at least one conductor deposited in a diagonal wiring direction coupled to a conductor deposited in the Manhattan wiring direction. Figure 10 of the subject patent application discloses sections of a wiring layer with both zig and zag configurations.

Rejection of the Claims Under 35 U.S.C. § 102 and § 103

In the Office Action dated January 3, 2002, claims 1, 10-12 and 14-16 were rejected under 35 U.S.C. § 102(b) as being anticipated by US Patent 5,541,005, issued to Bezama et al. (hereafter referred to as "*Bezama et al*"). Also, claims 1-9, 11 and 13 were rejected under 35 U.S.C. § 102(b) as being anticipated by US Patent 5,635,736, issued to Funaki et al. (hereafter referred to as "*Funaki et al.*").

Overview of Cited References:

Bezama et al discloses a ceramic greensheet article. Segments of a greensheet article are combined to form a larger green sheet. A metal wiring pattern is formed on at least one of the greensheet segments. Figure 1 of *Bezama et al* shows wiring patterns on

BEST AVAILABLE COPY

segments of the combined greensheet. The wiring patterns include wires deposited in an X direction (segments 12 and 16) as well as the Y direction (segments 14 and 18).

Funaki et al. disclose wiring for a MOS gate type semiconductor device. Figure 1 shows a two-layer structure SD wiring pattern. The length wise direction of the drain electrode is oblique to the axis at 45 degrees. A drain electrode is symmetrical to another drain electrode with respect to a line in the y axis direction formed at a position apart from that drain electrode in the x-axis. Thus, the drain electrodes constitute a "V" pattern separated at its center into two halves.

A. The References Do Not Disclose A Manhattan Directional Wire Coupled To A Diagonal Directional Wire In A Section With Diagonal Wires As The Preferred Direction.

Claim1 includes the features:

at least one metal layer comprising a plurality of sections, each section comprising at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit,

and

a second section comprising a preferred diagonal wiring direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction, said second section

BEST AVAILABLE COPY

further comprising at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction.

Accordingly, Applicants claim, in amended claim 1, a plurality of sections in a metal layer, wherein the second section, in addition to having wires deposited in the preferred diagonal wiring direction, includes "at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction." Applicants respectfully contend that the references do not disclose, either alone or in combination, a plurality of sections in a metal layer that includes a first section with a preferred directional wiring, a second section with wires deposited in the preferred diagonal wiring direction, different than the preferred direction of the first section and including at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction.

Bezama et al. disclose, in Figure 1, a plurality of sections, wherein each section has a wiring direction. *Bezama et al.* do not disclose wires deposited in different directions within the same section. Thus, *Bezama et al.* do not suggest or teach toward a wiring architecture with a conductor deposited in a diagonal direction coupled to a conductor deposited in a Manhattan direction. Similarly, *Funaki et al* do not disclose a wiring architecture with a conductor deposited in a diagonal direction coupled to a conductor deposited in a Manhattan direction. As such, *Bezama et al.* and *Funaki et al* do not anticipate claim 1.

BEST AVAILABLE COPY

As discussed above in conjunction with claim 1, *Bezama et al.* do not disclose wires deposited in different directions within the same section, and therefore *Bezama et al.* do not suggest or teach toward a wiring architecture with a conductor deposited in a preferred Manhattan direction coupled to a conductor deposited in a diagonal direction. Also, *Funaki et al* do not disclose a wiring architecture with a conductor deposited in a preferred Manhattan direction coupled to a conductor deposited in a diagonal direction. Accordingly, *Bezama et al.* and *Funaki et al* do not anticipate new claim 17.

C. The Use Of Zigs And Zags In A Section Of A Wiring Layer Provides More Efficient Wiring.

The claimed invention provides for an efficient wiring architecture. Typically, wires are deposited in a single direction on a wiring layer in an integrated circuit. The claimed invention divides a single wiring level in at least two sections. A preferred wiring direction is selected for each section. In addition to the conductors deposited in the preferred direction, at least one conductor, situated in a direction different than the preferred direction, is coupled to a conductor situated in the preferred direction.

Although it is advantageous to situate conductors of a section or layer in a uniform direction, the claim invention attains additional routing efficiencies by providing conductors in directions other than the preferred direction of a layer or section.

BEST AVAILABLE COPY

Specifically, the claimed invention increases the efficiency of a wiring layer by 1) including multiple sections with different preferred directions on a single wire layer and by 2) including at least one conductor, deposited in a different direction than the preferred wiring direction, coupled to a conductor deposited in the preferred wiring direction. The efficiencies achieved by this wiring architecture are not taught in the cited references.

Dependent Claims:

Dependent claims 2-16 are depend, either directly or indirectly, upon independent claim 1, and therefore for the same reasons claim 1 is patentable over the cited references, claims 2-16 are also patentable over the cited references.

BEST AVAILABLE COPY

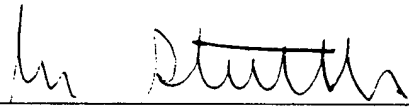
CONCLUSION

In view of the foregoing, it is submitted that the claims are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date.

Respectfully submitted,

STATTLER JOHANSEN & ADELI LLP

Dated: June 3, 02



John Stattler
Reg. No. 36,285

Stattler, Johansen & Adeli LLP
PO Box 51860
Palo Alto, CA 94303-0728
Phone: (650) 752-0990 ext.100
Fax: (650) 752-0995

BEST AVAILABLE COPY

The Amended Claims

The following pages provide the amended claims with the amendments marked with deleted material in [brackets] and new material underlined to show the changes made.

1. (Once Amended) An integrated circuit comprising:
at least one metal layer comprising a plurality of sections, each section comprising [a plurality of] at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit, wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section;

a first section comprising a first preferred direction for the conductors deposited in the first section; and

a second section comprising a preferred diagonal wiring direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction, said second section further comprising at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction.
3. (Once Amended) The integrated circuit as set forth in claim 2, wherein the first preferred diagonal direction comprises a direction perpendicular to said [a] preferred diagonal wiring direction in said second section.

BEST AVAILABLE COPY

7. (Once Amended) The integrated circuit as set forth in claim 6 [5],
wherein:

the first diagonal direction comprises an octilinear direction; and

the second diagonal direction comprises an octilinear direction complementary to
the first diagonal direction.

8. (Once Amended) The integrated circuit as set forth in claim 6 [5],
wherein:

the first diagonal direction comprises a hexilinear direction; and

the second diagonal direction comprises a hexilinear direction complementary to
the first diagonal direction.

9. (Once Amended) The integrated circuit as set forth in claim 6 [5],
wherein:

the first diagonal direction comprises an octilinear direction; and

the second diagonal direction comprises a hexilinear direction.

14. (Once Amended) The integrated circuit as set forth in claim 13 [12],
wherein:

the preferred direction comprises a diagonal direction; and

BEST AVAILABLE COPY

the direction different than the preferred direction comprises a Manhattan direction.

15. (Once Amended) The integrated circuit as set forth in claim 13 [12], wherein:

the preferred direction comprises a Manhattan direction; and

the direction different than the preferred direction comprises a diagonal direction.

16. (Once Amended) The integrated circuit as set forth in claim 13 [12], wherein the direction different than the preferred direction comprises a direction complementary to the preferred direction.

BEST AVAILABLE COPY



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/733,104	12/07/2000	Steven Teig	SPLX.P0004	2615

23349 7590 09/26/2002

STATTLER JOHANSEN & ADELI
P O BOX 51860
PALO ALTO, CA 94303

EXAMINER

CHU, CHRIS C

ART UNIT	PAPER NUMBER
----------	--------------

2815

DATE MAILED: 09/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/733,104

Applicant(s)

TEIG ET AL.

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 - 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on December 7, 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on June 12, 2002 has been received and entered in the case.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following phrases "the second section further comprising at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction" and "the first section further comprising at least one conductor deposited in a diagonal direction coupled to a conductor deposited in the Manhattan wiring direction" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect may be deferred until after

Art Unit: 2815

the examiner has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1 and 17 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claim 1, the specification fails to disclose the **second section** further comprising at least one conductor deposited in a **Manhattan direction** coupled to a conductor deposited in said preferred diagonal wiring direction.

In claim 17, the specification fails to disclose the **first section** further comprising at least one conductor deposited in a **diagonal direction** coupled to a conductor deposited in the **Manhattan wiring direction**.

A Manhattan style metallization layout may also be called a rectangular, or right-angle rectilinear metallization layout. Such a metallization layout is characterized by raised, elongate structures that have only substantially right-angle deviations from being straight or linear. ... (column 1, lines 52 ~ 60 of Juengling).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1 ~ 9, 11 and 13 ~ 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juengling.

Regarding claim 1, Juengling discloses in Fig. 8 an integrated circuit comprising:

- at least one metal layer comprising a plurality of sections, each section comprising conductors situated in a contiguous area to interconnect points on the integrated circuit, wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section;
 - a first section (left-down side of 817) comprising a first preferred direction for the conductors deposited in the first section; and
 - a second section (left-up side of 817) comprising a preferred diagonal wiring (801L, 802L, 803 or 804L) direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction, said second section (left-up side of 817) further comprising at least one conductor (842)

Art Unit: 2815

deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction (804L).

Juengling does not disclose at least one thousand conductors situated in a contiguous area. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adding at least one thousand conductors in a contiguous area, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The ordinary artisan would have been motivated to modify Juengling in the manner described above for at least the purpose of increasing speed of the package.

Regarding claim 2, Juengling discloses in Fig. 8 the first preferred direction comprising a diagonal direction.

Regarding claim 3, Juengling discloses in Fig. 8 the first preferred diagonal direction comprising a direction perpendicular to said preferred diagonal wiring direction in said second section.

Regarding claim 4, since Juengling does not limit the diagonal direction to any particular or specific direction, hence his/her disclosure encompasses all well known direction including an "octalinear direction."

Regarding claim 5, since Juengling does not limit the diagonal direction to any particular or specific direction, hence his/her disclosure encompasses all well known direction including a "hexalinear direction."

Art Unit: 2815

Regarding claim 6, Juengling discloses in Fig. 8 the first preferred direction comprising a first diagonal direction; and the second preferred direction comprising a second diagonal direction, different from the first diagonal direction.

Regarding claim 7, since Juengling does not limit the first or the second diagonal direction to any particular or specific direction, hence his/her disclosure encompasses all well known direction including an "octalinear direction" and the second diagonal direction is complementary to the first diagonal direction.

Regarding claim 8, since Juengling does not limit the first or the second diagonal direction to any particular or specific direction, hence his/her disclosure encompasses all well known direction including a "hexalinear direction" and the second diagonal direction is complementary to the first diagonal direction.

Regarding claim 9, since Juengling does not limit the first or the second diagonal direction to any particular or specific direction, hence his/her disclosure encompasses all well known direction including an "octalinear direction" for the first diagonal direction and a "hexalinear direction" for the second diagonal direction.

Regarding claim 11, Juengling discloses in Fig. 8 at least one more additional section (right side of 817) having a preferred direction comprising a diagonal direction.

Regarding claim 13, Juengling discloses in Fig. 8 at least one additional wire (832) deposited in a section with a direction different than the preferred direction of the section.

Regarding claim 14, Juengling discloses in Fig. 8 the preferred direction comprising a diagonal direction; and the direction different than the preferred direction comprising a Manhattan direction (842).

Art Unit: 2815

Regarding claim 15, Juengling discloses in Fig. 8 the preferred direction comprises a Manhattan direction (842); and the direction different than the preferred direction comprises a diagonal direction.

Regarding claim 16, Juengling discloses in Fig. 8 the direction different than the preferred direction comprising a direction complementary to the preferred direction.

Regarding claim 17, Juengling discloses in Fig. 8 an integrated circuit comprising:

- at least one metal layer comprising a plurality of sections, each section comprising conductors situated in a contiguous area to interconnect points on the integrated circuit, wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section;
 - a first section (left-up side of 817) comprising a Manhattan wiring (842) direction for the conductors deposited in the first section; the first section further comprising at least one conductor deposited in a diagonal direction (804L) coupled to a conductor deposited in the Manhattan wiring direction; and
 - a second section (left-down side of 817) comprising a preferred diagonal wiring (805) direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction.

Juengling does not disclose at least one thousand conductors situated in a contiguous area. It would have been obvious to one having ordinary skill in the art at the

Art Unit: 2815

time of the invention was made to adding at least one thousand conductors in a contiguous area, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The ordinary artisan would have been motivated to modify Juengling in the manner described above for at least the purpose of increasing speed of the package.

8. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juengling as applied to claim 1 above, and further in view of Rostoker et al. (U.S. Pat. No. 5,650,653).

Regarding claim 10, Juengling discloses the claimed invention except the first preferred direction comprising a first Manhattan direction. However, Rostoker et al. discloses in Fig. 2 a first preferred direction comprising a first Manhattan direction (the top part of 152 in an area 238). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Juengling by using a first Manhattan direction for a first preferred direction as taught by Rostoker et al. The ordinary artisan would have been motivated to further modify Juengling in the manner described above for at least the purpose of decreasing electromigration failure (column 4, lines 15 ~ 17 of Juengling).

Regarding claim 12, Juengling discloses the claimed invention except at least one more section having a preferred direction comprising a Manhattan direction. However, Rostoker et al. discloses in Fig. 2 at least one more section having a preferred direction comprising a Manhattan direction (the top part of 152 in an area 238). Thus, it would

Art Unit: 2815

have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Juengling by using a Manhattan direction for a preferred direction in at least one more section as taught by Rostoker et al. The ordinary artisan would have been motivated to further modify Juengling in the manner described above for at least the purpose of decreasing electromigration failure (column 4, lines 15 ~ 17 of Juengling).

Response to Arguments

9. Applicant's arguments with respect to claims 1, 3, 7 – 9 and 14 - 16 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

Art Unit: 2815

advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
September 19, 2002



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Notice of References Cited

Application/Control No.

09/733,104

Applicant(s)/Patent Under
Reexamination
TEIG ET AL.

Examiner

Chris C. Chu

Art Unit

2815

Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6448591 - B1	09-2002	Juengling	257/211
	B	US-5650653 - A	07-1997	Rostoker et al.	257/369
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707 05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application for:

Steven Teig

Serial No.: 09/733,104

Filing Date: 12/07/2000

For: MULTI-DIRECTIONAL WIRING ON A
SINGLE METAL LAYER

Examiner: Chu, Chris C.

Group Art Unit: 2815

#15
Appeal
Brief
J. McNeill
6/11/03

APPEAL BRIEF

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal from the final rejection of claims 1-17 in the above-referenced application. In accordance with 37 C.F.R. § 1.192, this Brief, along with the accompanying Appendices, is filed in triplicate and is accompanied by the required fee. Please charge any additional fees or credit any overpayment to Deposit Account No. 501128.

RECEIVED
JUN 10 2003
TECHNOLOGY CENTER

I. REAL PARTY IN INTEREST

The real party in interest to this Appeal is Cadence Design Systems, a Delaware Corporation, having its principal place of business in San Jose, California.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to appellant, the appellant's legal representative, or assignees thereof.

06/06/2003 MGBREH1 00000042 09733104

01 FC:1402

320.00 DP

III. STATUS OF CLAIMS

Claims 1-17 are pending in the present application. The examiner has rejected claims 1-17. Applicant hereby appeals the rejection of claims 1-17.

IV. STATUS OF AMENDMENTS

No amendments to the application were submitted after final rejection.

V. SUMMARY OF INVENTION

The claims (claims 1-16 and 17) are directed towards an integrated circuit having at least one metal layer that includes conductors to provide interconnectivity for the integrated circuit chip. For purposes of assigning preferred wiring directions for the conductors, the metal layer is divided into at least two sections (e.g., first section and second section). *Specification, page 2, lines 15-16.* Each section contains at least one thousand wires (*i.e.*, conductors) to interconnect points on the integrated circuit. *Specification, page 2, lines 16-17.* The conductors in each section are oriented in a preferred direction relative to the boundaries of the integrated circuit chip. A “preferred direction” is a direction in which at least fifty percent of the conductors are oriented. *Specification, page 2, lines 17-20.* **Figure 10** illustrates an example metal layer with multiple preferred directions.

The first and second sections of the claimed integrated circuit have different preferred wiring directions. One of the sections has a preferred wiring direction that is diagonal. A diagonal direction is neither vertical nor horizontal. Examples of diagonal directions include octalinear (*i.e.*, plus or minus 45 degrees from vertical or horizontal) and hexalinear (*i.e.*, plus or minus 30 or 60 degrees from vertical or horizontal). *Specification, page 3, lines 4-8; see also, page 6, lines 12-16.* **Figure 1b** illustrates an example of an integrated circuit that employs diagonal wiring. Furthermore, one of

the sections contains at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in a diagonal wiring direction. *See, for example, Figure 14.* A “Manhattan direction” is either vertical or horizontal. *Specification, page 3, lines 4-6.* **Figure 6a** illustrates an embodiment for a legacy Manhattan metal layer configuration.

VI. ISSUES

I. Whether the subject claims are unpatentable under 35 U.S.C. 112, first paragraph, as containing subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

II. Whether the drawings of the application disclosed every feature of the invention specified in the claims under 37 CFR 1.83(a).

III. Whether the subject claims are unpatentable under 35 U.S.C. 103(a) over Juengling (U.S. Pat. No. 6,448,591).

VII. GROUPING OF THE CLAIMS

Applicants contend that all of the pending claims (1-17) stand or fall together. Accordingly, applicants are not grouping the claims on appeal.

VIII. ARGUMENT

The examiner erred in rejecting the claimed invention by misapplying standards under 35 U.S.C. 112, first paragraph and 35 U.S.C. 103(a).

A. The Subject Claims Are Patentable Under 35 U.S.C. 112, First Paragraph.

In rejecting the subject claims under 35 U.S.C. 112, first paragraph, the examiner stated the following:

Applicant does not specifically define in the rejected claims that the Manhattan or Manhattan wiring direction is a horizontal line direction. Also, applicant should notes [sic] that the usual meaning of the term "Manhattan" is a rectangular or right-angle rectilinear. Since Fig. 10 and Fig. 14 do not show the rectangular or right-angle rectilinear line coupled to a conductor deposited in the preferred wiring direction, the objection to the drawings and the 112 1st rejection are maintained. Further, applicant should notes [sic] that the features upon which applicant relies (i.e., horizontal line to read as the Manhattan direction) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. *Advisory Action mailed April 17, 2003.*

This statement raises at least three distinct issues: 1) How are applicants using the term "Manhattan direction" in the subject claims? 2) Do Figures 10 and 14 accordingly show a conductor deposited in a Manhattan direction as defined by applicants coupled to a conductor deposited in the preferred wiring direction? 3) Do applicants have to recite the meaning of "Manhattan direction" in the claims, where it has been defined in the specification?

1. Applicants' Use of the Term "Manhattan Direction" Is Clear.

Through description in the specification or presentation in figures, applicants have clearly defined the term "Manhattan direction" to mean either a horizontal direction or a vertical direction. On page 3, lines 4-6 of the application as filed, applicants state: "In one embodiment, the first preferred direction is a Manhattan direction (*e.g.*, horizontal or vertical), and the second preferred direction is a diagonal direction." Applicants further refer to wiring directions depicted in **Figures 6a-6d** as "Manhattan wiring." The only wiring directions shown in the figures are horizontal and

vertical, and these directions are labeled as such.

It is well-established law that an applicant may be his or her own lexicographer as long as any special meaning assigned to a term is “sufficiently clear in the specification that any departure from common usage would be so understood by a person of experience in the field of the invention.” *MPEP 2111.01*, citing *Multiform Desiccants Inc. v. Medzam Ltd.*, 133 F.3d 1473 (Fed. Cir. 1998). Applicants have provided sufficient clarity in the specification such that one of ordinary skill would readily understand “Manhattan direction” to mean either “horizontal” or “vertical.”

2. Figures 10 and 14 Show a Conductor Deposed in a Manhattan Direction.

Figures 10 and 14 depict wiring deposed in diagonal, horizontal and vertical directions. Since “Manhattan direction” is clearly and properly defined in applicants’ specification to mean “horizontal” or “vertical,” the subject figures show a conductor deposed in a Manhattan direction.

3. Applicants Do Not Have to Recite “Horizontal” and/or “Vertical” in the Claims Instead of “Manhattan Direction” to Comply With 35 U.S.C. 112, First Paragraph.

Importing limitations into a claim from the specification is typically improper. The issue with respect to this appeal, however, is not that principle; it is rather the definition of “importing.” In this case, “importing” refers to the inclusion of a claim limitation that did not previously exist.

This difficult to understand concept is best seen through example. Take the example where a claim refers to “a hook,” and another part of the patent specification states the following about term “hook”:

A hook is a curved device for catching, holding, or pulling. A hook may be made of steel, iron, plastic or other suitable material. Typically, a hook contains a barb.

Preferably, a hook is at least 2 inches long.

When reading the claim reciting “a hook,” one would understand that “hook” refers to a “curved device for catching, holding, or pulling.” One would not understand, however, that the hook was steel, contained a barb, and was at least 2 inches long. It is accordingly improper to read the “steel,” “barb,” or “length” limitations regarding the hook into the claim.

To paraphrase the above-presented example, one does not improperly import limitations into a claim where one simply reads a term to have its unambiguous meaning. A meaning is unambiguous where it only contains those elements of a term definition that cannot vary. For the example above, a hook is always a “curved device for catching, holding, or pulling.” However, the composition of the hook (*e.g.*, steel), whether it contains a barb, and the length of a hook are all variable properties.

Applicants unambiguously defined “Manhattan direction” in their specification to mean “horizontal or vertical.” That definition is invariable. It is accordingly proper to read “Manhattan direction” in the subject claims as “horizontal or vertical,” and such a reading does not import limitations from the specification.

B. The Drawings of the Application Disclose the Features of the Invention Specified in the Claims Under 37 CFR 1.83(a).

In objecting to the drawings under 37 CFR 1.83(a), the examiner stated the following:

The drawings must show every feature of the invention specified in the claims. Therefore, the following phrases “the second section further comprising at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction” and “the first section further comprising at least one conductor deposited in a diagonal direction coupled to a conductor deposited in the

Manhattan wiring direction" must be shown or the feature(s) canceled from the claim(s). *Final Office Action mailed September 26, 2002, page 2.*

1. Figures 10 and 14 Show Conductors Deposited in a Manhattan Direction Coupled to a Conductor Deposited in a Diagonal Direction.

As described above, **Figures 10 and 14** depict wiring deposited in a Manhattan direction, which applicant has defined as a horizontal or vertical direction. In **Figure 10**, wire 1042 is deposited in a Manhattan direction (*i.e.*, horizontal), and it is coupled to a conductor deposited in a preferred, diagonal (*i.e.*, hexalinear direction of plus 60 degrees) direction. *See also description on page 21 of the application, lines 3-4.* In **Figure 14**, wire 1410 is deposited in a Manhattan direction (*i.e.*, horizontal), and it is coupled to a conductor deposited in diagonal (*i.e.*, 45 degree) direction. *See also description on page 26 of the application, lines 3-4.* The drawings accordingly do show all the features of the claimed invention.

C. The Subject Claims Are Patentable Under 35 U.S.C. 103(a) over Juengling (U.S. Pat. No. 6,448,591).

In rejecting the subject claims under 35 U.S.C. 112, first paragraph, the examiner stated the following:

Juengling does not disclose at least one thousand conductors situated in a contiguous area. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adding at least one thousand conductors in a contiguous area, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The ordinary artisan would have been motivated to modify Juengling in the manner described for at least the purpose of increasing the speed of the package. *Office Action mailed September 26, 2002, page 5.*

C

C

1. Juengling is Directed to Metallization Line Layouts that Avoid the Creation of Metallization Line Thinning and/or Disappearance for Excess Reflectance-Vulnerable Metallization Line Features.

Juengling delineates three significant problems for the process engineer seeking to fabricate metallization lines: 1) the focus offset sensitivity or depth of field capability of existing photolithographic equipment [col. 2, lns 65-67]; 2) lateral line thinning resulting from excess reflectance problems caused by photolithographic light [col. 3, lns 14-19]; and, 3) the possibility that interstitial particulate occurrence or a fabrication error will cause a bridge to form between adjacent metallization lines [col. 4, lns 18-22]. Juengling then proposes a way to address the problems. Specifically, he states that this objective is accomplished by “taking an existing metallization line layout that has been dictated by the fabrication of a semiconductor device array and . . . eliminating distant closest features that would otherwise cause the aforementioned problems” [Col. 4, lns 36-41]

The elimination of problematic distant closest features, according to Juengling, can be solved through at least four different means: 1) enhancing terminal ends of isolated metallization lines; 2) thickening metallization line widths to achieve substantially only nearby closest features; 3) filling spaces between metallization line features to achieve substantially standard preferred distance between any given metallization line feature and its nearest closest metallization line feature; and, 4) staggering unavoidable exposures to only have a single occurrence thereof on one side of the metallization line. [Col. 4, lns 41-55]

/

/

/

/

2. Juengling's Figure 8 Illustrates the Enlargement and Enhancement of Metallization Lines on a Theoretical Layout Containing Less than Twelve Non 90-Degree Wires.

Juengling presented his Figure 8 simply to make the point that metallization lines with non 90-degree features could be enhanced and enlarged just as "Manhattan-style" lines could. [Col. 14, lns 20-23] The figure shows 11-diagonally directed metallization lines connected to 9 different horizontal lines. Several of the lines are shown to be enhanced or enlarged, including, for example, portions 876 and 711.

Juengling does not state that the diagonally directed metallization lines provide any advantage with respect to line processing. He does not point to any desirable quality at all for diagonally directed lines.

3. Applicants' Claims are Directed to an Integrated Circuit Containing at Least One Section Having at Least 500 Wires Flowing in the Same Diagonal Direction.

Applicants' independent claims 1 and 17 are directed to an integrated circuit, where each section of the integrated circuit comprises at least one thousand conductors. Furthermore, in at least one of the sections, at least fifty percent (*i.e.*, at least 500) of the conductors are oriented in the same diagonal direction:

"[E]ach section comprising at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit. . . ." *Claim 1, clause 1; and, Claim 17, clause 1.*

"[W]herein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section. . . ." *Claim 1, clause 1; and, Claim 17, clause 1.*

"[A] second section comprising a preferred diagonal wiring direction for the conductors deposited in the second section." *Claim 1, clause 3; claim 17, clause 3.*

4. The Examiner Has Misapplied *In Re Boesch* to the Facts at Hand.

As presented above, in the September 26, 2002 Office Action, the examiner stated and/or implied that one of ordinary skill in the art viewing **Figure 8** of Juengling would have been motivated to modify Juengling's disclosure to arrive at Applicants' invention. To support his argument, the examiner stated that "optimizing" Juengling's **Figure 8** to arrive at an integrated circuit containing at least one section having at least 500 diagonal wires was routine. *Office Action, page 5*. He further cited *In re Boesch* as standing for that proposition.

In re Boesch is inapplicable to the facts at hand. It concerns the patentability of optimized "result-effective variables." "Result effective variables" are variables that achieve a recognized result. *MPEP 2144.05*. Specifically, if it is recognized that a variable controls a desirable result, then the optimum value for that variable is unpatentable under 35 U.S.C. 103; however, if one of ordinary skill would not understand that the variable is a result effective variable, then the optimum value for that variable could be patentable under 35 U.S.C. 103.

Juengling, in the case at hand, does not state that the number of diagonal wires affects any result. Certainly by increasing the number of diagonal wires, Juengling's method of enlarging and enhancing metallization lines would not be facilitated. Juengling, then, does not indicate that the number of diagonal wires is a result effective variable in integrated circuit design, and no one viewing Juengling would come to that conclusion. Applicants' invention is accordingly not an optimization of Juengling's.

5. The Examiner Has Improperly Used Applicants' Own Disclosure to Demonstrate a Motivation to Modify Juengling.

"The teaching or suggestion to make the claimed combination and the reasonable

expectation of success must both be found in the prior art, not in applicant's disclosure." *MPEP* 2143. In making his rejection under 35 U.S.C. 103(a) in view of Juengling, the examiner stated: "The ordinary artisan would have been motivated to modify Juengling in the manner described above [adding at least one thousand conductors] for at least the purpose of increasing speed of the package." *Office Action dated September 26, 2002, page 5*. Juengling, however, neither states nor suggests that adding at least one thousand conductors to his theoretical representation (*i.e.*, his **Figure 8**) would increase the speed of the package. His invention does not directly relate to package speed.

In contrast to Juengling, applicants explicitly point to their objective of increasing the operational speed of an integrated circuit:

The distance of the wiring on the metal layers determines the propagation delay exhibited during operation of the circuit components. In turn, the propagation delay introduced in a circuit directly impacts the operational speed of the circuit). The length of the wire determines the amount of propagation delay introduced into a circuit (*i.e.*, the longer the wire the greater the propagation delay). In addition, when circuit connections are routed between metal layers, using mechanisms referred to as "vias", a significant amount of additional propagation delay is introduced. Accordingly, it is desirable to reduce the length of wires necessary to interconnect electronic components in an IC to reduce the propagation delay and to enhance the operational speed of the IC. It is also desirable to minimize the number of circuit connections routed between metal layers to further reduce the propagation delay. *Specification, page 2, lines 1-11*.

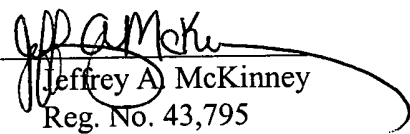
Applicants further note that one way to achieve their objective is through the presently claimed invention. *See specification pages 2, line 14 to page 4, line 8*. Therefore, applicants' disclosure teaches that one can increase the speed of an integrated circuit by having a circuit section that contains at least 500 diagonal lines running in the same direction.

It is difficult to forget applicants' teachings while viewing art that the examiner believes is relevant to the patentability of applicants' invention, but that is the requirement under 35

U.S.C. 103. In this case, the requirement has not been met.

IX. CONCLUSION.

In view of the foregoing, applicants respectfully submit that the claims are patentable and the drawings fully comply with the appropriate rules. Applicants hereby request that the Board overturn the examiner's finding that the claims are unpatentable under 35 U.S.C. 112, first paragraph and 35 U.S.C. 103(a).

BY: 
Jeffrey A. McKinney
Reg. No. 43,795
Date: June 3, 2003
Tel. No.: 650.752.0990 ext. 103

APPENDIX

The following claims are the subject of this Appeal.

1. An integrated circuit comprising:

at least one metal layer comprising a plurality of sections, each section comprising at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit, wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section;

a first section comprising a first preferred direction for the conductors deposited in the first section; and

a second section comprising a preferred diagonal wiring direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction, said second section further comprising at least one conductor deposited in a Manhattan direction coupled to a conductor deposited in said preferred diagonal wiring direction.

2. The integrated circuit as set forth in claim 1, wherein the first preferred direction comprises a diagonal direction.

3. The integrated circuit as set forth in claim 2, wherein the first preferred diagonal direction comprises a direction perpendicular to said preferred diagonal wiring direction in said second section.

4. The integrated circuit as set forth in claim 1, wherein the diagonal direction comprises an octalinear direction.

5. The integrated circuit as set forth in claim 1, wherein the diagonal direction comprises a hexalinear direction.

6. The integrated circuit as set forth in claim 1, wherein:
the first preferred direction comprises a first diagonal direction; and
the second preferred direction comprises a second diagonal direction, different from the first diagonal direction.

7. The integrated circuit as set forth in claim 6, wherein:
the first diagonal direction comprises an octalinear direction; and
the second diagonal direction comprises an octalinear direction complementary to the first diagonal direction.

8. The integrated circuit as set forth in claim 6, wherein:
the first diagonal direction comprises a hexalinear direction; and

the second diagonal direction comprises a hexalinear direction complementary to the first diagonal direction.

9. The integrated circuit as set forth in claim 6, wherein:

The first diagonal direction comprises an octalinear direction; and

The second diagonal direction comprises a hexalinear direction.

10. The integrated circuit as set forth in claim 1, further comprising at least one more additional section having a preferred direction comprising a diagonal direction.

11. The integrated circuit as set forth in claim 1, further comprising at least one more section having a preferred direction comprising a Manhattan direction.

12. The integrated circuit as set forth in claim 1, further comprising at least one additional wire deposited in a section with a direction different than the preferred direction of the section.

13. The integrated circuit as set forth in claim 12, wherein:

the preferred direction comprises a diagonal direction; and

the direction different than the preferred direction comprises a Manhattan direction.

14. The integrated circuit as set forth in claim 13, wherein:

the preferred direction comprises a diagonal direction; and

the direction different than the preferred direction comprises a Manhattan direction.

15. The integrated circuit as set forth in claim 13, wherein:

the preferred direction comprises a Manhattan direction; and

the direction different from the preferred direction comprises a diagonal direction.

16. The integrated circuit as set forth in claim 13, wherein the direction different than the preferred direction comprises a direction complementary to the preferred direction.

17. An integrated circuit comprising:

at least one metal layer comprising a plurality of sections, each section comprising at least one thousand conductors situated in a contiguous area to interconnect points on the integrated circuit, wherein a preferred direction, within a section, defines a direction, relative to the boundaries of the integrated circuit, for at least fifty percent of conductors in the section;

a first section comprising a Manhattan wiring direction for the conductors deposited in the

first section, the first section further comprising at least one conductor deposited in a diagonal direction coupled to a conductor deposited in the Manhattan wiring direction; and

a second section comprising a preferred diagonal wiring direction for the conductors deposited in the second section, such that the diagonal wiring preferred direction is a direction different from the first preferred direction.